

Project Report: Late Ordovician Mass Extinction and Recovery: Diversity Dynamics and Geographic Variability

Project Progress

This year, our efforts went into expanding the database beyond Laurentia to other paleocontinents so that we can test for geographic variability in the Late Ordovician mass extinction and post-extinction rebound. Much of the time was spent vetting the data for stratigraphic resolution, depositional environment, and taxonomic assignments.

Significant progress was made for the paleocontinent of Baltica (greater part of northern Europe); the data now comprise 251 collections and 2976 occurrences. A preliminary sample-standardized analysis of diversity in Baltica indicates that diversity did not rebound significantly from the Late Ordovician mass extinction and resembles more the global unstandardized data of Sepkoski. We are still trying to work out what this means, but it shows clearly that there is geographic variability to the recovery from the Late Ordovician mass extinction. Why Laurentia recovered so much more quickly is still not known, but it may have oceanographic explanations such as Laurentia was positioned in the path of a major marine invertebrate larval dispersal route, whereas Baltica was not. We also began collecting data for the paleocontinent of Avalonia (England, Wales, and parts of Ireland, France, Belgium, Newfoundland, Nova Scotia, New Brunswick, and New England), which will give us good latitudinal coverage from the equator (Laurentia) to the subtropics (Baltica) to nearly 60 degrees South (Avalonia).

Recently, there was a suggestion that the Late Ordovician glaciation and mass extinction were caused by a gamma ray burst from a nearby supernova. The authors of this hypothesis made some predictions of extinction patterns, such as shallow marine organisms should be affected preferentially over deep marine organisms. Ultimately, we will be able to test this and other geographic patterns of extinction with our database.

Highlights

- Once adjustments have been made for variations in sampling intensity, recovery from the Late Ordovician mass extinction appears to have occurred within 5 million years rather than 20 million years as previously

thought. This suggests the need for similar adjustments of sampling intensity in studies of all other Phanerozoic mass extinctions.

Roadmap Objectives

- **Objective No. 4.3:** Effects of extraterrestrial events upon the biosphere